





NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
MANNED SPACECRAFT CENTER  
HOUSTON, TEXAS 77058

IN REPLY REFER TO: 70-FC91-270

DEC 18 1970

MEMORANDUM TO: Distribution

FROM : FC/Apollo 14 Flight Director

SUBJECT : ALSEP 4 (Apollo 14) Mission Rules Review

The ALSEP 4 Mission Rules Review was held Thursday, December 3, 1970, at the Lunar Science Institute. Attendees are as listed in the enclosure.

The review resulted in several generally minor changes being agreed upon. Rules affected are:

31-71 R. - Amended	31-114 - Cue Order Change
S. - Amended	
31-72 B. - Addition	31-119 - Note Addition
H. - Addition	31-120 - Ruling Amendment
I. - Addition	Note Amendment
31-73 C. - Amended	31-121 - Cue Amendment, Addition
G. - Amended	
H. - Amended	31-122 - Ruling B Amendment
I. - Addition	Note Change
J. - Addition	
31-74 A. - Amended	31-134 - Ruling Amended
C. - Amended	31-135 - Ruling B Amended
D. - Amended	All Notes Deleted
F. - Amended	
G. - Deleted	31-137 - Ruling Amended
31-75 A. - Amended	31-139 - Amended
C. - Amended	
E. - Addition	31-141 - Note Addition
31-76 - Amended	31-142 - Cue Amended
31-81 - Cue Amendment	31-143 - Amended
31-102 - Cue Amendment	31-144 - Ruling Amended
31-107 - Cue Addition	31-155 - Amended
31-110 - Ruling G, Addition	

*Asil*



Specific changes will appear in a forthcoming revision to the mission rules.

Two of the more significant items discussed at the meeting were the determination of when the Active Seismic Experiment (ASE) grenade mortars should be launched, and the decision logic which would be followed in the event commanding difficulties are encountered during deployment or ASE thumper sequences. Discussion of these two items follows:

a. Launching time of ASE mortars:

It is desirable to conduct the grenade launch sequence of the ASE at a time when

- lunar seismic activity and noise are near a minimum, and
  - when the science data being gathered by other experiments is of low or routine interest.
- further,
- The earlier the firing, the more likely it is that data affecting Apollo 16 and 17 seismic experiments' design can be acted upon.
  - The earlier the firing, the more likely it is that failures affecting the conduct of the experiment will not have occurred.
  - The later the firing, the more likely it is that adverse permanent effects of the firing upon other experiments will not adversely affect experiment data interpretation.
  - Presuming the ASE mortar events do produce long-term effects in the remainder of the ALSEP (e.g., changes in thermal characteristics), such effects will not be noticeable unless sufficient baseline data from the unperturbed systems have been gathered. Flight Control considers approximately three lunar daytime periods to be the minimum time acceptable for gathering this baseline data.

On the basis of scientific value of the ASE mortar activity, it is desirable to fire the mortars at the first occurrence of favorable conditions yet, because of possible danger to the other experiments, it is advisable to delay the mortar firing until after "sufficient" significant data has been gathered by the ALSEP. The mortars must be fired before the ALSEP lifetime has expired, i.e., while the ALSEP remains operational. The 3 month time remains tentative.

The question remains concerning the degree of danger presented to the other experiments by the mortar fire. Dr. Kovach mentioned that tests have been conducted and that empirical data is available concerning overpressures,



particle size, and particle velocity at certain distances from the GLA. ASPO (Mr. Stan Blackmer) accepted the action item to provide FOD with an ASPO position on mortar firings.

b. Commanding difficulties during ASE activation. Mission rules 31-133, 31-134, and 31-135 were discussed and will appear reflecting the following rationale:

- If the ground is unable to command the ASE to "operate select," the crew will be asked to perform this function, using Switch No. 4. Presuming the rest of the command system is intact, the crew will proceed with an otherwise normal "thumper" experiment, and depart the area with a normal closeout except the ASE will be left in "operate select," rather than "standby." Since the ASE will not survive lunar night in "operate select," the mortar firing experiment will be accomplished at some appropriate time during that first lunar day. We believe the risks associated with leaving the experiment in "operate" with the crew on the surface, and with firing the mortars early, are small compared to the gain associated with conducting the mortar experiment and obtaining ASE data. (Consideration can be given to "safing" and re-arming the system by crew action during the EVA-2 period.)
- If the ground is unable to command the ALSEP to "high bit rate," the crew will perform this function, using Switch No. 4. Presuming the rest of the command system is intact, the crew will proceed with an otherwise normal "thumper" experiment, and depart the area with a normal closeout. At some time during EVA 2, the crew will return to the ALSEP and re-actuate Switch No. 4, once more placing the package in "high bit rate." As soon as practicable after LM ascent, the mortar experiment will be conducted. The ALSEP will then be commanded to "normal bit rate" and readied for ascent stage impact data receipt. This rationale accepts the risks associated with early mortar firing and lack of significant ALSEP systems data during LM ascent in order to gain the advantage of performing the ASE mortar experiment. (Sufficient time shall have elapsed between EVA's to assure proper activation and checkout of other experiments and systems during this time.)
- If the ground is unable to command the ALSEP to "high bit rate off" (normal bit rate), as determined following the ASE thumper experiment, the crew shall perform this function using Switch No. 5. The "high bit rate" command will never again be transmitted. Mortar firings will be accomplished at a time in accord with guidelines, so that some minimal data can be obtained via the passive seismometer experiment. (This action will also be taken to lessen the eventual remote danger associated with leaving "live" ordnance on the moon.)

Questions and comments on the foregoing may be directed to K. K. Kundel,  
FC9, x3786.

  
M. P. Frank

FC93:JJNemec:jcc

Rewritten by B. L. Sharpe

# MISSION RULES REVIEW

## ATTENDEES

<u>NAME</u>	<u>ORGANIZATION</u>	<u>PHONE</u>
J. R. Bates	MSC-TM5	3734
G. V. Latham	Lamont	
W. G. McDonald	Lamont	914-EL7-2900
E. M. Davin	NASA Hq./MAL	202-962-6628
D. F. Nicolson	NASA-FC22	3838
J. E. Saultz, Sr.	NASA-FC9	4746
K. K. Kundel	NASA-FC9	3786
M. P. Frank	NASA-FC	5888
J. Lobb	MSC-PT	2078
B. L. Sharpe	MSC-FC9	3786
M. H. Hait	USGS	602-774-1483
W. Eichelman	TM3	2666
D. J. McDonald	FC9	3786
R. L. Kovach	Stanford Univ.	415-321-2300 X4827
G. D. Griffith	FC9	4746
J. W. Roach	FC	2551
J. H. Cooper	FC9	3786
E. Smith	NB-5	2868
P. D. Nering	FC9	3786
U. Polking	NASA Hq/MAO	202-962-4887
W. K. Stephenson	TM5	3734
H. A. Zook	FC9	3786
D. Toups	FC9	3786
R. H. Koos	FC9	4746
B. R. Hurlbut	TRW	2313
S. M. Blackmer	PD7	2457
B. H. Walton	TM	3638
W. A. Smith	Rice Univ.	X1130
H. K. Hills	Rice Univ.	X1111
J. E. Crane	TM5-GE	3734

*Encl*



MISSION RULES REVIEW ATTENDEES (CONT'D)

<u>NAME</u>	<u>ORGANIZATION</u>	<u>PHONE</u>
D. L. Reasoner	Rice Univ.	1135
R. R. Miley	TDX-BxA	5067
H. W. Wilson	BxA	313-665-2268
R. A. Keely	TDX-BxA	5067
J. F	Rice	1297
F. Herbert	TM	3638
R. H. Nute	CF	3091
W. P. LeCroix	EH2	3811
W. Tosh	Bendix	313-665-7766
R. Bradford	BxA/FC-9	3786
T. C. Newton	TBC/FC-9	3786
J. Nemec	PHO/FC9	3786
J. James	PHO/FC9	3786
J. Moser	PHO/FC9	3786
J. D. Harris	EH4	2094
G. P. Barnes	TM5/GE	3734

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AC/G. W. Abbey  
CF/R. H. Nute  
EA/R. A. Gardiner  
EH/D. G. Wiseman  
P. D. Gerke  
J. H. Langford  
EH2/W. P. LeCroix  
E. L. Weeks  
EH4/J. D. Harris  
FA/S. A. Sjoberg  
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FC2/C. S. Harlan  
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NA/W. M. Bland  
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TM/J. G. Zarcaro  
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M. L. Miller  
TM5/W. K. Stephenson  
J. R. Bates  
J. E. Crane  
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PD7/S. M. Blackmer  
PT/D. D. Arabian  
J. D. Lobb

TA/A. J. Calio  
TF/D. E. Evans

NASA Hqs./D. Beattie, MAL  
E. M. Davin, MAL  
U. Polking, MAO

G. V. Latham & W. G. McDonald  
Lamont-Doherty Geological Observatory  
Columbia University  
Palisades, N. Y. 10964

M. H. Hait  
Center of Astrogeology  
U. S. Geological Survey  
601 E. Cedar Avenue  
Flagstaff, Arizona 86001

R. L. Kovach  
Department of Geophysics  
Stanford University  
Stanford, Calif. 44300

TRW-B. R. Hurlbut, H2-2092

Rice University  
6100 Main  
Houston, Texas 77001/J. Freeman  
W. A. Smith  
H. K. Hills  
D. L. Reasoner

TDX (BxA)/R. R. Miley  
H. W. Wilson  
R. A. Keely

W. Tosh  
Bendix Aerospace Systems Division  
3300 Plymouth Road  
Ann Arbor, Michigan 48107

Dr. F. S. Johnson  
Univ. of Texas at Dallas  
P. O. Box 30365  
Dallas, Texas 75230